I claim:

1. An imaging system that is adapted to image objects in a selected object region in a volume, where said volume includes a medium of propagation that enables ultrasonic wave propagation in said object region, where objects in said selected object region cause ultrasonic effects, and where said medium causes frequency dependent attenuation, where attenuation varies over operating frequencies, where said imaging system includes transducer apparatus that transmits and receives waves that propagate in said medium, where said transducer apparatus enables spot focusing of propagating waves at focus points in said selected object region, where said spot focusing enables approximately exclusive sensing in spots, where a spot is a volume region about a focus point that is enclosed by diffraction limited effects that result from focusing of a propagating wave, and

apparatus that operates to cause transmit-receive events for respective said selected spots, where a transmit-receive event includes transmitting of signals to form a focused outgoing wave that is focused for said spot and receiving of signals to cause focusing, for said spot, of incoming waves, where operation of said transmit-receive event enables acquisition of signals that arise from ultrasonic effects that occur in said spot, and

apparatus that operates to control positions of said focus points to cause a collection of said spots that approximately continuously covers said selected object region in said volume, where overlap of said transmit-receive events enables rapid scanning of said collection of said spots, and

apparatus that compensates for said frequency dependent attenuation, where compensation causes compensated signals that are associated with said spot, where frequency components of a compensated signal are constant in amplitude over said system operating frequencies, where said compensation is determined for a point in said spot and where size of said spot is sufficiently small that said compensation is effective for any point in said spot, and

apparatus to form image data using such compensated signals from said collection of said spots.

2. An imaging system according to claim 1, where said approximately exclusive sensing serves to suppress signals that arise from points outside a said spot.

3. An imaging system according to claim 1, and apparatus that enables broad band operation for purposes of resolving signals in time.

4. An imaging system according to claim 1,where said compensation applies corrections to signals prior to said transmission of signals, such that transmitted signals are pre-compensated signals that enable said compensated signals.

5. An imaging system according to claim 1, including apparatus that applies said compensation after reception to produce said compensated signals.

6. An imaging system according to claim 1, including apparatus that operates to compensate signals for apparatus transfer functions that cause output signals that have a distorted frequency spectrum, where distortion corrections enable output signals with a relative frequency spectrum that is approximately the same as a relative spectrum of a corresponding input signal.

7. An imaging system according to claim 1, including code apparatus that enables coded signal operations that enhance said approximately exclusive sensing, where unique codes are generated for respective spots, where for said spot, a unique code is used to generate a coded signal and a coded replica signal, and said coded signal is carried through said system such that said system acquires coded, compensated, signals from said spot, and where said coded replica signal is held in storage, and said code apparatus also enables pre-set correlation of waveforms, where a waveform is a signal amplitude as a function of time and pre-set correlation includes multiplication of respective amplitudes of two waveforms, that are in a pre-set time relationship, to obtain a product waveform and integrating said product waveform, and pre-set correlation is operated to compare said

coded replica signal with said coded, compensated, signals from said spot, where said multiplication begins at a fixed time that is a time of arrival expected for a compensated signal from said spot, where said correlation produces an integration output that is a correlated signal sample from said spot, and said correlated signal sample is utilized in producing an image data sample.

8. An imaging system according to claim 1, including apparatus that enables viewing where said selected object region is a planar region defined as a set of all points in the immediate vicinity of a plane that are in a selected portion of said volume.

9. An imaging system according to claim 1, including apparatus that operates to cause transmit-receive events for respective said spots includes operation where a plurality of transmit events overlap in time such that said focus spots rapidly cover a said selected object region.

10. An imaging system according to claim 1, including apparatus to hold a coupling substance between an active surface of said transducer apparatus and said volume, such that said medium is extended to enable ultrasonic propagation between said transducer apparatus and said volume.

11. An imaging system according to claim 1, including apparatus to hold a coupling substance between an active surface of said transducer apparatus and said volume, such that said medium is extended to enable ultrasonic propagation between said transducer apparatus and said volume, and said coupling substance is a fluid that enables motion of said transducer apparatus relative to said volume.

12. An imaging system according to claim 1, including apparatus to hold a coupling substance between an active surface of said transducer apparatus and said volume, such that said medium is extended to enable ultrasonic propagation between said transducer

apparatus and said volume, where said coupling substance is an attenuation leveling substance, where attenuation characteristics of said coupling substance match attenuation effects of that portion of said medium that is contained within said volume, such that said attenuation leveling substance enables propagation of wavefronts where relative amplitudes of respective signals that are distributed over a wavefront are not significantly changed by attenuation effects of said medium.

13. An imaging system according to claim 1, where said transducer apparatus is arranged such that transmitting transducers are also receiving transducers.

14. An imaging system according to claim 1, where said transducer apparatus is arranged such that transmitting transducers and receiving transducers are distinct from each other.

15. An imaging system according to claim 1, where said transducer apparatus is arranged as a first array and a second array that in a bistatic arrangement, where said first array and said second array are separated, and for a given said transmit-receive event, a transmit operation is enabled by said first array and a receive operation is enabled by said second array.

16. An imaging system according to claim 1, where said transducer apparatus is arranged as a first array and a second array in a bistatic arrangement, where said first array and said second array are separated, and for a given said transmit-receive event, a transmit operation is enabled by said first array and a receive operation is enabled by said second array, and transmit wavefronts produced by said transmit operation are substantially separate from that portion of wavefronts that develops into a wavefront portion that is received by said receive operation, where such separation suppresses cross-over interference signals.

17. An imaging system according to claim 1, and mechanical apparatus that provides mechanical motion of said transducer apparatus such that a plurality of said selected spots are positioned by operation that includes operation of said mechanical apparatus.

18. An imaging system according to claim 1 that is adapted for breast imaging, where said volume is a volume of breast tissue.

19. An imaging system that is adapted to image objects in a selected object region in a volume, where said volume includes a medium of propagation that enables ultrasonic wave propagation in said object region, where objects in said selected object region cause ultrasonic effects, where said imaging system includes

transducer apparatus that transmits and receives waves that propagate in said medium, where said transducer apparatus enables spot focusing of propagating waves at focus points in said selected object region, where said spot focusing enables approximately exclusive sensing in selected spots, where a spot is a volume region about a focus point that is enclosed by diffraction limited effects that result from focusing of a propagating wave, where a coupling fluid is contained between said transducer apparatus and said volume to enable propagation of ultrasonic waves between an active transducer surface and said volume, and containment of said coupling fluid is arranged to enable motion of said transducer apparatus relative to said volume, and said coupling fluid has attenuation characteristics at system operating frequencies that match respective attenuation characteristics at said system operating frequencies of said medium of propagation, and

apparatus that operates to cause transmit-receive events for respective said selected spots, where a transmit-receive event includes transmitting of signals to form a focused outgoing wave that is focused for a selected spot and receiving of signals to cause focusing, for said selected spot, of incoming waves, where operation of said transmit-receive event enables selective sensing of ultrasonic effects that occur in said selected spot, where said transmit-receive events cause controlled focus point positions such that

said selected spots approximately continuously cover said selected object region in said volume, and

apparatus that operates to convert results of said selective sensing to enable display of an image that enables viewing of said objects.

20. An imaging system according to claim 19, and correlation apparatus to correlate signals in a pre-set time relationship, where a correlation channel is set for an arrival time of an assumed signal from said selected spot, such that a replica signal and said assumed signal would correlate to produce a data sample that would indicate amplitude of said assumed signal, where operation of said correlation apparatus thus produces data samples that enable determination of image signals.

21. An imaging system according to claim 19, where said transducer apparatus is a cylindrical transducer apparatus having a cylindrical axis, where said cylindrical transducer has an active surface that enables focusing of ultrasonic waves at focus points that are distributed along said cylindrical axis.

22. An imaging system according to claim 19, where said transducer apparatus is a cylindrical transducer apparatus having a cylindrical axis, where said cylindrical transducer has an active surface that enables focusing of ultrasonic waves at focus points that are distributed along said cylindrical axis, where said cylindrical transducer apparatus includes a cylindrical transmitting transducer apparatus and a cylindrical receiving transducer apparatus that are separate.

23. An imaging system according to claim 19, where said motion includes a mechanical scanning motion of said transducer apparatus that enables scanning over a said selected object region that is a region about a plane.

24. An imaging system according to claim 19, where said transducer apparatus includes two arrays of transducers that are sparse arrays, where a first array has a first sparse element distribution that causes grating lobes in a first set of positions, and a second array has a second sparse element distribution that causes grating lobes in a second set of positions, and said first set of positions does not intersect with said second set of positions.

25. An imaging system according to claim 19, and apparatus to cause hybrid beamforming, where an active aperture is shifted by changing signal path connections to cause shift in a lateral direction of a focus spot, where said switching causes a coarse increment change in position of said focus spot, and signal processing means to cause an angle adjustment of focused wave propagation, to cause a fine increment change in position of said focus spot, and a hybrid effect of coarse increment changes and fine increment changes enables scanning that causes continuous focus spots in said lateral direction.

26. An imaging system according to claim 19, and apparatus to compensate for attenuation variations as a function of frequency, where said coupling fluid enables propagation where all waves at each frequency are subjected to an approximately known attenuation rate per unit distance, where compensation requires adjusting each frequency component of signals to cause compensated signals, where frequency components of a compensated signal have a constant amplitude over said operating frequencies, where determination of adjustments for a spot is enabled by said approximately known attenuation rate per unit distance.

27. An imaging system according to claim 19, where said controlled focus point positions are controlled by a combination of mechanical and electronic apparatus.

28. A large aperture array of transducers configured to enable ultrasonic focusing at a focus spot in a propagation medium, where said transducers are formed as strips that are attached to a backing surface, and said strips are of transducer material that enables a transducer function that couples ultrasonic operation with electrical operation, where said electrical operation is in relation to an electric field that is parallel to said backing surface.

29. An array according to claim 28, where said strips are cut into segments that cause a strip to function as a plurality of individual transducers that are connected to respective electric circuits.